

To Whom It May Concern



LEVEL: Grades 6-12

SUBJECTS: Consumer Education, English (Language Arts, Communications), Social Studies (Civics, Debate, Government)

SKILLS: Analyzing, applying, brainstorming, classifying, collaborating, collecting data, communicating, comparing similarities and differences, comprehending, concluding, debating, developing self-understanding, discussing, empathizing, evaluating, identifying, inferring, interpreting, listening, reading, recording, researching, synthesizing, taking responsibility, valuing, writing

MATERIALS

Writing materials; current issues of newspapers, magazines and newsletters; phone book; envelopes; postage stamps; several dictionaries; photocopies of the attached **What Is Being Said?, My Point of View, Issue Investigation, Issue Facts and Opinions, Their Point of View, Issues Ranking Chart** sheets; photocopies of the nine attached food biotechnology examples; and computer research tools.

VOCABULARY

constituents, controversy, emotional appeal, fact, issue, opinion, sidestepping, topic

SUPPORTING INFORMATION

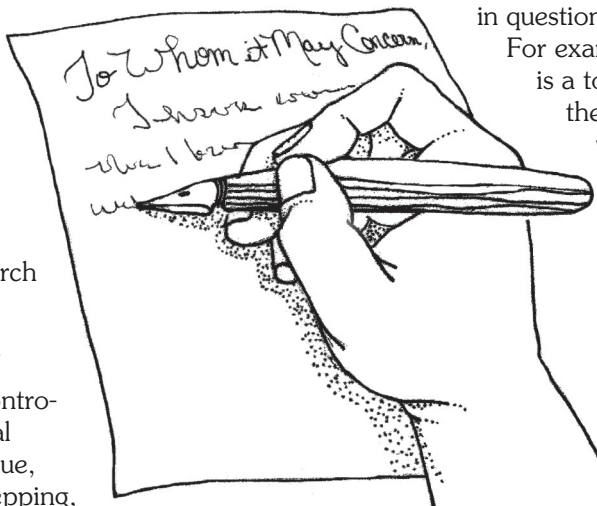
In our democratic society, all people are urged to be responsible citizens. This responsibility involves a willingness to become informed and involved and the ability to take action. Citizens can take action by exercising their voice through letters to elected officials, businesses and organizations. This lesson, designed to illustrate and encourage responsible citizenship, shows students how to take informed action on a controversial issue.

Controversial issues are rarely simple or limited to two sides. This is particularly true when issues involve the

relationship between agriculture, the environment, and human populations. Such complex issues tend to become very emotional.

Many students have difficulty understanding the difference between a topic and an issue. A topic is the subject under discussion or study. An issue is the point in question about the topic.

For example, water use is a topic. An issue is the allocation of water. Another topic is genetic engineering. An issue is the labeling of products that are genetically engineered. Controversy emerges from issues.



In examining a controversial issue, students must be able to distinguish between facts and opinions. Facts are statements that can be proven to be true. Opinions, on the other hand, are points of view, judgments or conclusions. Ideally, opinions are formed by facts; however, opinions sometimes are stated as facts.

When researching issues, students need to understand the techniques used to discuss controversial issues. People supporting particular positions may use the same techniques used by propagandists. For example, issues may be sidestepped rather than directly addressed. Also, people may appeal to emotions rather than to facts.

BRIEF DESCRIPTION

After conducting research, students write a letter expressing their opinions about a controversial issue. Students either choose an issue or use the issue examples about the labeling of genetically engineered foods.

OBJECTIVES

The student will:

- identify a controversial issue;
- conduct research about the issue;
- define, identify and collect examples of facts, opinions, and opinions stated as facts;
- analyze the compiled information to form an opinion about the issue;
- express an opinion in class and in a formal business letter written to an individual, group or organization; and
- implement the lesson model with any issue or with one of the issue examples of food biotechnology.

ESTIMATED TEACHING TIME

Six sessions: 45 to 60 minutes each, plus some time for student research. (This lesson can form the basis of a unit.)

Once a student has an informed opinion, it is time to take action. One way is by writing letters. Letter writing is an effective tool for making an individual's voice heard. Many businesses and organizations are concerned about the opinions of their consumers, stockholders and employees. When voting on controversial issues, elected officials consider letters from constituents.

Public officials use a "rule of thumb" to estimate public opinion. It is based on the amount of effort expended by a constituent to communicate. Usually the greater the effort or costs required to express an opinion to an elected official, the stronger that opinion and the higher number of constituents that feel likewise. A spontaneous letter from constituents and telephone calls from constituents top the list of "Most Powerful Influences on Members of Congress" compiled by Joel Blackwell, Issue Management Co., Cornelius, North Carolina.

Suggestions for effective letter writing include the following.

- Write a personal letter using your own words rather than using a form letter.
- State the issue early in the letter.
- Be constructive and polite, not insulting or sarcastic.
- Say what needs to be said in one page.
- Limit your letter to one topic or one issue.
- Send letters about different issues in separate envelopes.
- Ask for a response and request to be informed of possible action regarding the issue.

Addresses for state senators, representatives, other public officials, organizations, government agencies, and other groups can be found in the phone book or at your local library. The United Nations, United Nations Plaza, New York, NY 10017, can help you find the address of a world leader. Write to the person's embassy in care of the above address.

When writing to government officials, it is important to have the address correct. The following addresses include the letter greeting as well as the mailing address. Some important addresses include:

1. The President
The White House
1600 Pennsylvania Avenue, NW
Washington, DC 20500
(Dear Mr. President:)

2. The Honorable _____
Senate Office Building
Washington, DC 20510
(Dear Senator _____:)

3. The Honorable _____
House Office Building
Washington, DC 20515
(Dear Representative _____:)



Expect delays when communicating through a hard copy with your elected officials. Extra security imposed since the terrorist attacks on September 11, 2001, and letters containing anthrax sent to Congressional leaders have resulted in delays receiving communications through the U.S. mail or other distribution services. E-mail or faxes will streamline efforts to communicate with elected officials. When contacting members of Congress or state legislatures, e-mail letters should be used, whenever possible, and are preferred by those holding public office.

To send e-mail to the President of the United States: president@whitehouse.gov

To send e-mail to the Vice President of the United States: vice.president@whitehouse.gov

To send e-mail to United States Senators: locate the Senator's e-mail address at http://www.senate.gov/contacting/index_by_state.cfm and use the e-mail address provided.

To send e-mail to United States House of Representatives: locate the Representatives Web site at <http://www.house.gov/house/MemberWWW.html> and use the e-mail address provided.

GETTING STARTED

Choose Option 1 or Option 2 in Session One (remaining sessions apply to both options). For each option, photocopy the following.

Option 1 Photocopy for Food Biotechnology Example
One per student
What Is Being Said?

My Point of View

One per group of three students

Issue Investigation

Issue Facts and Opinions

Their Point of View

One article per one-third of the students (cut articles apart)

Labeling Requirements and Regulation of Bioengineered Foods

Product Labeling

A Sampling of Biotech Products On The Market

A Sampling of Biotech Products Soon Available On the Market

FDA to Strengthen Pre-market Review of Bioengineered Foods

IACP ON TOUR: Exploring the Issues of Food Biotechnology

The American Medical Association Updates Position On Food Biotechnology

The Organic Farmers' and Organic Consumers' Perspective On Genetically Engineered Organisms

Biotechnology and the Future of Food - Position of ADA

Note: At the end of the lesson is one page of **Possible Information from the Food Biotechnology Example**, if using Option 1. This information is to serve as a guide for you only. There are no right or wrong answers for any of the student sheets.

Option 2 Photocopy for Issue of Choice

One per student

My Point of View

Issues Ranking Chart

Optional: **What Is Being Said?**

One per individual, pair, or small group of students

Issue Investigation

Issue Facts and Opinions

Their Point of View

Gather several dictionaries; writing materials; current issues of newspapers, magazines, and newsletters; phone book; envelopes; stamps. **Optional:** Make arrangements for students to use computers for online research.

PROCEDURE

SESSION ONE (Proceed to Option 1 or Option 2)

Option 1 Food Biotechnology Example

1. Distribute to individual students a copy of **What Is Being Said?** and one of the nine articles. Have students form a group with others who are assigned the same article. Give each group a dictionary. Explain that the topic is genetically engineered foods, while the issue is the labeling of those foods. (Genetic engineering involves modifying the genetic material of living things.)

Groups will become experts on their article so that each group member can teach the information to classmates who have a different article. Have students begin reading and studying the articles. Encourage them to use the dictionaries. **Optional:** Have the groups become research teams. The task is to read the article and to conduct research on the topics in the articles.

2. After groups have studied the articles and individual students have completed **What Is Being Said?**, move students into groups of three. Each trio should consist of one expert per article. Students share and discuss the three articles and their information on the **What is Being Said?** sheet.
3. Distribute one **Issue Investigation** sheet to each trio. Explain that students will be forming their own opinion about the labeling of genetically engineered foods and expressing it in a letter. Groups fill in the columns using information from their articles and **What Is Being Said?** sheets. Discuss additional possible sources of information (newspapers, radio, magazines, interviews, council meetings, newsletters, brochures, television; see Resources). Proceed to Session Two.

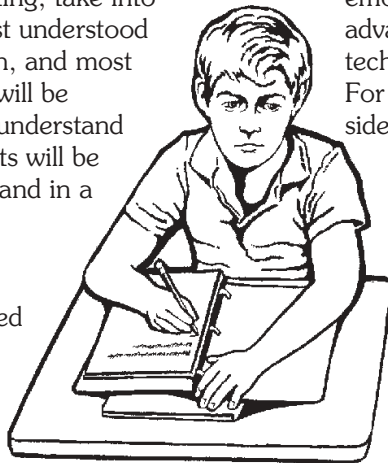
Option 2 Issue of Choice

1. Survey the class to discover current topics of interest or concern involving agriculture, the environment, people, and/or their relationship (e.g., land use, farm issues, endangered species, urban sprawl). Write the topics in a visible place. Discuss the issues surrounding the topics (see Supporting Information). Have students convert the topics into issues and write these in a visible place.
2. Distribute copies of **Issues Ranking Chart** to each student. Have each student write the topics and issues and check whether the issues are global (involving all countries), international (involving one or more countries), national, statewide, or local. (If the issue is global, none of the preceeding boxes need to be checked; same with international, national and state. See the **Issues Ranking Chart Examples** following the Educator's Notes section.)

3. Referring to the **Issues Ranking Chart**, ask students to rank the issues according to how much they know about the issue. Number one would be the issue of which they know the most. In a separate ranking, ask students to rank the issues according to their own level of concern or interest. Again number one would be the most interesting.

4. Have students meet in groups of three to five students. In the groups, students discuss their individual top three issues and select the group's top three issues for knowledge and interest to share with the class. Using the top three issues from each group's list, compile the ranking for both categories (knowledge and interest). Decide as a class the issue(s) students would like to investigate for a class action project. Students also may work individually, in pairs, or in small groups with a common interest. When selecting, take into account the issues that are best understood by students, easiest to research, and most interesting. Tell students they will be conducting research to better understand the issues. Explain that students will be expressing their ideas in class and in a letter to be mailed.

5. Research an issue in history whose outcome was determined based on the influence of a vocal, mobilized, and informed citizenry. Tell students they will be writing information in all the columns during their research. Discuss possible sources of information (e.g., newspapers, radio, magazines, interviews, council meetings, newsletters, online services, brochures, television; see Resources). Assign students to begin collecting and reading sources of information. **Optional:** Students can use **What is Being Said?** as a tool to understand and organize information.



Fact:	Many groups use freshwater.
Opinion:	I believe farmers should be able to use as much water as they need.
Opinion stated as fact:	It is important for urban areas to have priority in decisions about water use.

3. To reinforce students' understanding of the difference between topics and issues, have students identify the topic in the above example. (*water use*) Then have them state the issue. (*allocation of water*)
4. Explore the tone that writers or speakers use when discussing issues. The tone is the attitude or emotion conveyed toward the subject. With advanced students, discuss the use of the techniques of sidestepping and emotional appeal. For example, a writer debating allocation of water sidesteps the issue when he or she discusses levels of water pollution.

Another writer might appeal to the reader's emotions rather than to facts. For example, one writer wrote a story about the mental breakdown of a farmer when he lost his great-grandfather's farm because it lacked water. The writer was using emotional appeal instead of addressing the issue of allocation of water.

5. Distribute **Issue Facts and Opinions**. Have students give examples of a fact, an opinion, and an opinion stated as a fact about their issues. Students use the information from their **Issue Investigation** sheet and the discussion to record examples on their **Issue Facts and Opinions**.

SESSION THREE

1. Help students understand that there are often many sides or positions about an issue. Have them refer to **Issue Investigation**. Ask:
- Are there more than two sides to your issue? How many positions are there?
 - What are some of the different positions about your issue?
 - What areas of agreement exist between the different positions about your issue?
 - Exactly what are the differences about which individuals or groups find it difficult to agree?

SESSION TWO

1. Discuss the information students have gathered from the articles and resources listed on **Issue Investigation**. (This sheet can be added to as students collect more information.)
2. Assess students' knowledge of the difference between facts and opinions. Define and discuss the differences. (*Facts are neutral statements that can be proven. Opinions are points of view, judgments or conclusions.*) Explain that opinions are sometimes stated as facts, but that does not make them facts. For example:

2. Make sure students take the necessary time to do their research and understand the history leading to the controversy. (They may need assistance to identify the individuals, groups and organizations involved in their issue. It may not be critical to identify all the parties involved, but at least two parties are essential.)
3. Distribute copies of the ***Their Point of View*** sheet. Explain that knowledgeable, wise opinions are best formed after studying other points of view. Have students use their ***Issue Investigation*** and ***Issue Facts and Opinions*** sheets in identifying at least two different positions. Have them complete ***Their Point of View***.

SESSION FOUR

1. Discuss briefly the information recorded on ***Their Point of View***. Distribute copies of ***My Point of View*** to each student.
2. When preparing to compose their letter, have students complete ***My Point of View***. Student opinions may vary widely. They may have their own opinion, an opinion similar to someone from their ***Issue Investigation***, or a combination of their opinion and that of others.
3. Brainstorm various purposes for writing a letter about the issue (e.g., to bring the issue to an individual's or group's attention, to ask the reader's position on the issue, to sway the reader, to propose a solution, to suggest action).
4. List possible groups or people to whom the students could write (e.g., a public official, and a group or organization holding a similar or opposing point of view).
5. Ask students to suggest effective techniques for writing a letter. Introduce any important points they missed (see Supporting Information). Record the techniques in a visible place for easy reference.
6. Have students write a draft of the letter.
7. Have students edit the drafts of their peers. Encourage students to look for a clear statement of

the problem, constructive and polite opinions or resolutions, correct business letter form, and accurate punctuation, grammar, sentence structure, and spelling.

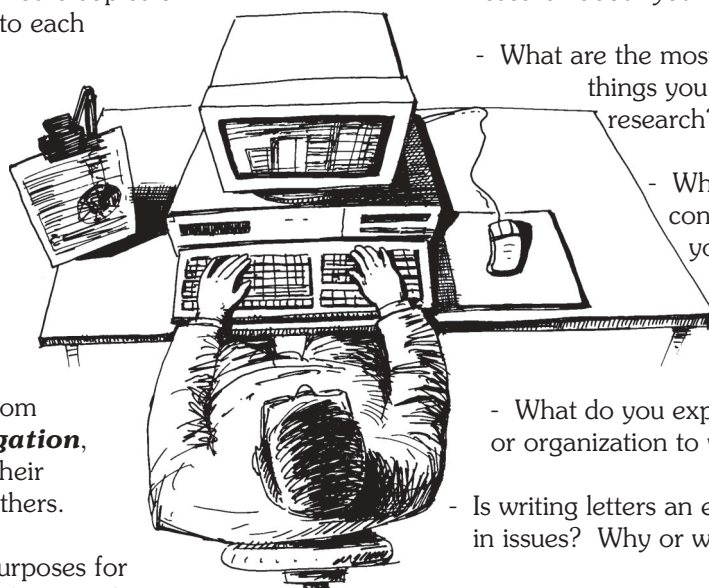
SESSION FIVE

1. Following the feedback from the peer editing, have students revise their letters. You need to review students' letters to correct omissions from the peer-editing process. Encourage them to type the final drafts. Mail the letters.
2. Ask:
 - What did you like about working in groups? What did you dislike?
 - What is the most useful thing you learned in your research about your issue?
 - What are the most and the least interesting things you learned in conducting your research?
 - What did you learn in conducting your research that you can use in the future?
 - What surprised you the most?
 - What do you expect to hear from the person or organization to whom you wrote?
 - Is writing letters an effective way to get involved in issues? Why or why not?
 - In what other ways can you get involved in issues?
 - What other issues interest you?
3. Encourage students to continue tracking their issues.

SESSION SIX

After students have received responses, discuss and summarize the responses received. Ask:

- What surprised you about the response you received? How does it compare with what you expected to hear?
- Did your response include sidestepping? Emotional appeals?
- What facts were in the response? Opinions?



Opinions stated as facts?

- How did the response of the writer affect your opinion of the issue?

EVALUATION OPTIONS

1. Evaluate students' sheets for understanding and completeness. Note participation levels by students during large- and small-group discussions and research.
2. Evaluate the students' letters based on criteria such as conciseness, polite tone, position on the issue, clarity, explanation of personal concern, demonstration of research and understanding of the issue, the suggested resolution, grammar, punctuation, and spelling.
3. Give students some basic information about a real or imaginary controversy. Have them write two newspaper articles, one factual and one slanted or opinionated. Discuss the differences.
4. Have students write four issues that concern them. Then have them pick one and state a fact, an opinion, and an opinion stated as a fact about it.

EXTENSIONS AND VARIATIONS

1. Invite an elected official or his or her representative to speak about the influence of citizen voices in the public decision-making process.
2. Videotape a debate of students representing various sides of a controversial issue. Based on assigned roles, students must research, clearly state their positions, and offer a resolution.
3. Follow local elections to learn the position of politicians on the issues that concern students. Have them write a campaign speech about the issue, that they would want to hear a politician deliver to receive their vote.
4. Make a bulletin board by posting all the research information as well as copies of letters and the responses that students receive.
5. Research an issue in history whose outcome was determined based on the influence of a vocal, mobilized, and informed citizenry. Example: U.S. withdrawal from the Vietnam War.
6. Gather the names and addresses of public officials at the local, county, state, and national levels. Publish a directory for any future letter writing to be conducted by the students, their families, and other students. Put a copy of the directory in the

school library. Keep it updated.

7. Write a letter every quarter about an issue that concerns or interests students.
8. Students poll their parents or a sample of adults to determine how much additional money people would be willing to pay for their grocery items to have all genetically engineered foods labeled. They also can poll to determine what percentage of their sample actually read food labels and what types of information are important or interesting to them.

CREDITS

Agricultural Biotech Products on the Market. Council For Biotechnology Information. 1625 K Street, NW, Suite 1100, P.O. Box 34380, Washington, DC 20043-0380. 2002. <http://www.bio.org/food&ag/approvedag98.html>

An Urgent Message on Genetic Engineering from CCOF. California Certified Organic Farmers. 2002. <http://www.ccof.org>

Blackwell, Joel. *Most Powerful Influences on Members of Congress*. Issue Management Company, Cornelius, North Carolina. <http://www.joelblackwell.com/findout.htm>

Contacting Your Government. FIRSTGOV. <http://firstgov/Contact.shtml>

Dunau, Mark. *Genetically Engineered Organisms*. Northeast Organic Farmer's Association - New York (NOFA-NY). <http://nofany.org/hottopics/geneticallyengineeredorganisms.html>

"FDA to Strengthen Pre-Market Review of Bioengineered Foods." *HHS News*. United States Department of Health and Human Services. May 3, 2000. <http://www.fda.gov/bbs/topics/NEWS/NEW00726.html>

Formanek, Raymond Jr. "Proposed Rules Issued for Bioengineered Foods." *FDA Consumer Magazine*. Food and Drug Administration. March-April 2001.

Genetically Modified Crops and Foods. American Medical Association. 515 North State Street, Chicago, IL. 2000. <http://www.ama-assn.org/ama/pub/article/2036-4030.html>

Henkel, John. "Genetic Engineering Fast Forwarding To Future Foods." *FDA Consumer*. United States Food and Drug Administration. April 1995 (Revised February 1998). <http://www.fda.gov/bbs/topics/CONSUMER/geneng.html>

"IACP ON TOUR: Exploring the Issues of Food Biotechnology." *Food Insight*. International Food Information Council Foundation (IFIC). July/August 2001. <http://www.ific.org>

International Food Information Council Foundation (IFIC). 1100 Connecticut Avenue, NW Suite 430, Washington, D.C. 20036. <http://ific.org>

Thompson, Larry. "Are Bioengineered Foods Safe?" *FDA Consumer Magazine*. United States Food and Drug Administration. January-February 2000. http://www.fda.gov/fdac/features/2000/100_bio.html

ADDITIONAL RESOURCES

Ackerman, Jennifer. "Food: How Safe? How Altered?" *National Geographic*. Vol.201. No.5. May 2002.

Agricultural Biotech Products on the Market. Council For Biotechnology Information. 1625 K Street, NW, Suite 1100, P.O. Box 34380, Washington, DC 20043-0380. 2002. <http://www.bio.org/food&ag/approvedag98.html>

Agricultural Biotechnology. Biosafety Library, Animal and Plant Health Inspection Service, United States Department of Agriculture. <http://www.aphis.usda.gov/ppq/biotech/biosafe.html>

Agricultural Biotechnology Briefing Room. Economic Research Service, United States Department of Agriculture. <http://www.ers.usda.gov/Briefing/biotechnology>

Agricultural Biotechnology: Marketing, Labeling, and Trade. Agricultural Biotechnology Briefing Room. Economic Research Service, United States Department of Agriculture. <http://www.ers.usda.gov/Briefing/biotechnology/chapter2htm>

Agricultural Biotechnology: Permitting, Notification, and Deregulation. Animal and Plant Health Inspection Service, United States Department of Agriculture. <http://www.aphis.usda.gov/ppq/biotech>

Landa, Norbert and Patrick Baeuerle. *Ingenious Genes: Microexplorers: Learning About The Fantastic Skills of Genetic Engineers and Watching Them at Work*. Barrons Juvenile. 1998. ISBN: 0764150634.

Biotechnology. Office of Science Coordination and Policy, United States Environmental Protection Agency. <http://www.epa.gov/oscpmont/oscpbiotech.htm>

Biotechnology and Food Safety. Food and Agriculture Organization, United Nations. <http://www.fao.org/WAICENT/FAOINFO/ECONOMIC/ESN/biotech/tabconts.htm>

Biotechnology Permits: 7 Code of Federal Regulations part 340. Animal and Plant Health Inspection Service, United States Department of Agriculture. <http://www.aphis.usda.gov/ppq/biotech/7cfr340.html>

Blackwell, Joel. *Most Powerful Influences on Members of Congress*. Issue Management Company, Cornelius, North Carolina. <http://www.joelblackwell.com/findout.htm>

Charles, Daniel. *Lords of the Harvest: Biotech, Big Money, and the Future of Food*. Perseus Books. 2001. ISBN: 0738202916.

Contacting Your Government. FIRSTGOV. <http://firstgov/Contact.shtml>

Council For Biotechnology Information. 1625 K Street, NW, Suite 1100, P.O. Box 34380, Washington, DC 20043-0380. <http://www.whybiotech.com>

"FDA to Strengthen Pre-Market Review of Bioengineered Foods." *HHS News*. United States Department of Health and Human Services. May 3, 2000. <http://www.fda.gov/bbs/topics/NEWS/NEW00726.html>

Formanek, Raymond Jr. "Proposed Rules Issued for Bioengineered Foods." *FDA Consumer Magazine*. Food and Drug Administration. March-April 2001.

Genetically Modified Crops and Foods. American Medical Association. 515 North State Street, Chicago, IL. 2000. <http://www.ama-assn.org/ama/pub/article/2036-4030.html>

Genetically Modified Pest-protected Plants: Science and Regulation. National Research Council. Washington, DC. National Academy Press. 2000.

Harvest on the Horizon: Future Uses of Agricultural Biotechnology. Pew Initiative on Food and Biotechnology. Pew Charitable Foundation. <http://pewagbiotech.org/research/harvest>

Henkel, John. "Genetic Engineering Fast Forwarding To Future Foods." *FDA Consumer*. United States Food and Drug Administration. April 1995 (Revised February 1998). <http://www.fda.gov/bbs/topics/CONSUMER/geneng.html>

Horn, Floyd, Ph.D. *Genetically Modified Organisms (GM)s in the Global Marketplace*. Agricultural Research Service, United States Department of Agriculture. 2001. http://www.ars.usda.gov/speeches/gen_mod/slide01.html

“IACP ON TOUR: Exploring the Issues of Food Biotechnology.” *Food Insight*. International Food Information Council Foundation (IFIC). July/August 2001. <http://www.ific.org>

International Food Information Council Foundation (IFIC). 1100 Connecticut Avenue, NW Suite 430, Washington, D.C. 20036. <http://www.ific.org>

Lambrecht, Bill. *Dinner at the New Gene Café: How Genetic Engineering is Changing What We Eat, How We Live, and the Global Politics of Food*. St. Martin's Press. 2001. ISBN: 0312265751.

List of Completed Consultations on Bioengineered Foods. Center for Food Safety & Applied Nutrition, Food and Drug Administration, United States Department of Health and Human Services. March 2002. <http://www.cfsan.fda.gov/~lrd/biocon.html>

Marshall, Elizabeth. *High-Tech Harvest: A Look at Genetically Engineered Foods*. Franklin Watts. 1999. ISBN: 0531114341.

Martineau, Belinda. *First Fruit: The Creation of the Flavr Savr Tomato and the Birth of Biotech Foods*. McGraw Hill Text. 2001. ISBN: 0071360565.

Maryanski, James H. Ph.D. “Bioengineered Foods: Will They Cause Allergic Reactions?” Center for Food Safety & Applied Nutrition, Food and Drug Administration, United States Department of Health and Human Services. October-November 1997. <http://www.cfsan.fda.gov/~dms/pubalrgy.html>

Safety of Genetically Modified Foods. AgBiotechNet. <http://www.agbiotechnet.com/topics/GMsafety.asp>

Seeds of Opportunity: An Assessment of the Benefits, Safety, and Oversight of Plant Genomics and Agricultural Biotechnology. United States House of Representatives. Washington, DC. 2000.

Thompson, Larry. “Are Bioengineered Foods Safe?” *FDA Consumer Magazine*. United States Food and Drug Administration. January-February 2000. http://www.fda.gov/fdac/features/2000/100_bio.html

TSCA Biotechnology Program. Office of Pollution Prevention and Toxics, United States Environmental

Protection Agency. <http://www.epa.gov/opptintr/biotech/index.html>

“The Weight of Evidence: Assessing the Safety of Biotech Foods.” *Food Insight*. International Food Information Council Foundation. May/June 2000. <http://www.ific.org/proactive/newsroom/release.vtml?id=18022>

WEB SITES

Agricultural Biotechnology. United States Department of Agriculture. <http://www.usda.gov/agencies/biotech>

Agricultural Research Service, United States Department of Agriculture. <http://www.ars.usda.gov>

The American Dietetic Association. <http://www.eatright.org>

Biotechnology. Animal & Plant Health Inspection Service, United States Department of Agriculture. <http://www.aphis.usda.gov/biotech>

California Certified Organic Farmers. <http://www.ccof.org>

Center for Food Safety & Applied Nutrition, United States Food and Drug Administration. <http://vm.cfsan.fda.gov/list.html>

Contacting Your Government. FIRSTGOV. <http://firstgov/Contact.shtml>

Council for Agricultural Science & Technology. <http://www.cast-science.org>

Council for Biotechnology Information. <http://www.whypiotech.com>

Economic Research Service, United States Department of Agriculture. <http://www.ers.usda.gov>

Institute of Food Technologists. <http://www.ift.org>

Environmental Protection Agency. <http://www.epa.gov>

International Food Information Council Foundation. <http://www.ific.org>

Northeast Organic Farmer's Association - New York (NOFA-NY). <http://nofany.org>

Organic Consumers Association. <http://www.organicconsumers.org>

EDUCATOR'S NOTES

ISSUES RANKING CHART EXAMPLES

TOPICS	ISSUES	CATEGORIES					STUDENT RANKING	
		LOCAL	STATE	NATIONAL	INTER-NATIONAL	GLOBAL	KNOW-LEDGE	INTEREST
Urbanization	Conversion of agricultural land				✓		3	7
Drinking water	Quality of drinking water				✓		5	6
Literacy	Access to education					✓	9	3

WHAT IS BEING SAID?

Name: _____

Directions: In a large group, read your article to answer What?, Who?, When?, How?, and Why? It's important to understand your article because you will become the expert about its contents when you form a trio with other students.

Title of article: _____

Source: _____

Date: _____

WHAT? (What is the article about? What are the main points or features? In what tone is the article written? What else do you want to know?)

WHO? (Who is giving the information? Who is being quoted? Who is involved?)

WHEN? (When did it happen? When could it change?)

HOW? (How is the information presented? How was information gathered? How can you use this information to understand the issue? How can this affect you? Others?)

WHY? (Why are the information and the issue important? Why investigate the issue?)

MY POINT OF VIEW

Name: _____

Research Issue: _____

My opinions about this issue are:

My opinions are based on the following facts:

I plan to write to:



THEIR POINT OF VIEW

Names: _____

Research Issue: _____

The position of _____ is

based on the following facts:

The position of _____ is

based on the following facts:

The position of _____ is

based on the following facts:

ISSUE INVESTIGATION

Names: _____

Research Issue: _____

What is known about this issue	Sources of information for research	Individuals and groups involved in this issue	Who or what this issue is affecting	History of this issue

ISSUE FACTS AND OPINIONS

Names: _____

Research Issue: _____

Facts about this issue (neutral statements that can be proven)	Opinions about this issue (points of view, judgments, conclusions)	Opinions stated as facts about this issue

Name:

Description: A topic is the subject under discussion or study. An issue is the point in question about the topic.

[illegible]

LABELING REQUIREMENTS AND REGULATION OF BIOENGINEERED FOODS

Since 1994, a growing number of foods developed using the tools of the science of biotechnology have come onto both the domestic and international markets. With these products has come controversy, primarily in Europe where some question whether these foods are as safe as foods that have been developed using the more conventional approach of hybridization. Bioengineered foods actually are regulated by three federal agencies: Food and Drug Administration (FDA), the Environmental Protection Agency (EPA), and the United States Department of Agriculture (USDA). FDA is responsible for the safety and labeling of all foods and animal feeds derived from crops, including biotech plants. EPA regulates pesticides, so any change that would incorporate pesticide action would fall under its jurisdiction. USDA's Animal and Plant Health Inspection Service oversees the agricultural environmental safety of planting and field-testing genetically engineered plants.

With the tools developed from biotechnology, a gene can be inserted into a plant to give it a specific new characteristic instead of mixing all of the genes from two plants and seeing what comes out. This technology provides much more control over, and precision to, what characteristic breeders give to a new plant. It also allows the changes to be made much faster than ever before. No matter how a new crop is created—using traditional methods or biotechnology tools—breeders are required by our colleagues at the U.S. Department of Agriculture to conduct field testing for several seasons to make sure only desirable changes have been made. They must check to make sure the plant looks right, grows right, and produces food that tastes right. They also must perform analytical tests to see whether the levels of nutrients have changed and whether the food is still safe to eat.

In 1992, the Food and Drug Administration (FDA) published a policy explaining how existing legal requirements for food safety apply to products developed using the tools of biotechnology. It is the agency's responsibility to ensure the safety of all foods on the market that come from crops, including bioengineered plants, through a science-based decision-making process. This process often includes public comment from consumers, outside experts and industry. FDA established, in 1994, a consultation process that helps ensure that foods developed using biotechnology methods meet the applicable safety standards. Over the last five years, companies have used the consultation process more than 40 times as they moved to introduce genetically altered plants into the U.S. market.

As the FDA has evaluated the results of the seeds or crops created using biotechnology techniques, it has seen no evidence that the bioengineered foods now on the market pose any human health concerns or that they are in any way less safe than crops produced through traditional breeding. All of the foods that have been placed on the market through the tools of biotechnology are nontoxic, rapidly digestible, and do not have the characteristics of proteins known to cause allergies.

As for the genes, the chemical that encodes genetic information is called DNA. DNA is present in all foods and its ingestion is not associated with human illness. Some have noted that sticking a new piece of DNA into the plant's chromosome can disrupt the function of other genes, crippling the plant's growth or altering the level of nutrients or toxins. These kinds of effects can happen with any type of plant breeding—traditional or biotech. That's why breeders do extensive field-testing. If the plant looks normal and grows normally, if the food tastes right and has the expected levels of nutrients and toxins, and if the new protein put into food has been shown to be safe, then there are no safety issues.

Some people are concerned about food allergies. If one is allergic to a food, it needs to be rigorously avoided. Further, we don't want to create new allergy problems with food developed from either traditional or biotech means. It is important to know that bioengineering does not make a food inherently different from conventionally produced food. And the technology doesn't make the food more likely to cause allergies. Fortunately, we know a lot about the foods that do trigger allergic reactions. About 90 percent of all food allergies in the United States are caused by cow's milk, eggs, fish and shellfish, tree nuts, wheat, and legumes, especially peanuts and soybeans.

To be cautious, FDA has specifically focused on allergy issues. Under the law and FDA's biotech food policy, companies must tell consumers on the food label when a product includes a gene from one of the common allergy-causing foods unless it can show that the protein produced by the added gene does not make the food cause allergies. So far, none of the new proteins in foods evaluated through the FDA consultation process have caused allergies. Because proteins resulting from biotechnology and now on the market are sensitive to heat, acid and

continued

enzymatic digestion, are present in very low levels in the food, and do not have structural similarities to known allergens, we have no scientific evidence to indicate that any of the new proteins introduced into food by biotechnology will cause allergies. To alert sensitive consumers, FDA will require labeling for a food that contains a new protein with characteristics suggesting that it may be a food allergen. If we find that labeling will not adequately protect consumers, we will take steps to prevent marketing of the product.

Under the federal Food, Drug, and Cosmetic Act, companies have a legal obligation to ensure that any food they sell meets the safety standards of the law. This applies equally to conventional food and bioengineered food. If a food does not meet the safety standard, FDA has the authority to take it off the market. In the specific case of foods developed utilizing the tools of biotechnology, FDA set up a consultation process to help companies meet the requirements. While consultation is voluntary, the legal requirements that the foods have to meet are not. All bioengineered foods on the market have gone through FDA's process before they have been marketed.

Traditional and bioengineered foods are all subject to the same labeling requirements. All labeling for a food product must be truthful and not misleading. If a bioengineered food is significantly different from its conventional counterpart—if the nutritional value changes or it causes allergies—it must be labeled to indicate that difference. For example, genetic modifications in varieties of soybeans and canola changed the fatty acid composition in the oils of those plants. Foods using those oils must be labeled, including using a new standard name that indicates the bioengineered oil's difference from conventional soy and canola oils. If a food had a new allergy-causing protein introduced into it, the label would have to state that it contained the allergen.

Foods developed through genetic engineering do not differ as a class in quality, safety, or any other attribute from foods developed through conventional means. That's why there has been no requirement to add a special label saying that they are bioengineered. Companies are free to include in the labeling of a bioengineered product any statement as long as the labeling is truthful and not misleading. Obviously, a label that implies that a food is better than another because it was, or was not, bioengineered, would be misleading.

In January 2001, the FDA proposed tightening the scrutiny of bioengineered foods making the consultation process mandatory. Now manufacturers are required to prove that the bioengineered foods are as safe and nutritious as their traditional counterparts. In addition, the FDA has also drafted guidelines for companies that wish to indicate that food or feed either has or has not been developed using biotechnology. The FDA maintains that labels must be truthful and not misleading to consumers. The term genetically engineered may be used to describe products but not the terms "genetically modified (GM)," "genetically modified organism (GMO)," or "modified." Consumer focus groups assembled by the FDA indicated that manufacturers should indicate why a product carries such a label. Final regulations will be forthcoming.

Not only must the food that Americans eat be safe, but consumers must have confidence in its safety, and confidence in the government's role in ensuring that safety. Policies grounded in science, developed through open and transparent processes, implemented rigorously, and communicated effectively are what have assured the consumers' confidence in an agency that has served this nation for nearly 100 years. To insure that the FDA maintains public confidence the agency is seeking public input about its policies and will continue to reach out to the public to help consumers understand the scientific issues and the agency's policies.

Excerpted from statements by Jane E. Henney, M.D., Commissioner, Food and Drug Administration Public Health Service, Department of Health and Human Services. *FDA Consumer Magazine*. United States Food and Drug Administration. January-February 2000. http://www.fda.gov/fdac/features/2000/100_bio.html and Formanek, Raymond Jr. "Proposed Rules Issued for Bioengineered Foods." *FDA Consumer Magazine*. United States Food and Drug Administration. March-April 2001.

PRODUCT LABELING

Product labeling has presented the area of greatest concern in connection with food biotechnology, but mainly as a result of misperception of FDA's policy. The FDA policy guidelines state that foods produced through biotechnology will be subject to the same labeling laws as all other foods and food ingredients. Labeling would be required for biotech products in some instances -- but not because the products were made using biotech.

Labeling will be required when a product contains a food allergen or if the nutritional composition of the product has been changed. If a food produced through modern biotechnology or any other method meets any of these criteria, it will carry a label. For example:

- Peanuts are a common allergen. If a gene from peanuts were inserted into potatoes or corn, where people would not expect to find peanut allergens, then the vegetables would have to be labeled to alert sensitive consumers. Potential food allergy is an example of a health or safety risk that would mandate a product label.
- A researcher may improve the flavor of a fruit which traditionally contains a certain level of vitamin C. If the new variety is changed in a way that results in either higher or lower amounts of vitamin C, then that information would have to be disclosed. Nutritional content is an example that relates to the products usual composition or identity. Any substantial changes to this expected composition will mandate a product label.
- If genetic engineering or any other breeding technique changed the composition of a peach so that it's not the same peach anymore, then it would have to be called something different. It would have to have a different varietal name or, if the difference was extremely substantial, it may not even be called a peach any longer. The proper identity of a food product is information that must be provided in all cases.

FDA invited public comment on the labeling policy because the agency understands the public holds diverse opinions about what information should appear on product labels. The request for comments focused on what criteria should be used to invoke labeling, as well as an assessment of the practical impact of labeling requirements. At this time, the FDA continues to analyze the data and comments it received, and plans to host a public hearing on labeling issues. The public comments will help the FDA evaluate the labeling requirements and ensure a sound policy.

Source: *Food Biotechnology, Federal Regulation & Labeling*. International Food Information Council. October 1993 and revised 2000.

FDA TO STRENGTHEN PRE-MARKET REVIEW OF BIOENGINEERED FOODS

The Food and Drug Administration (FDA) announced today plans to refine its regulatory approach regarding foods derived through the use of modern biotechnology. The initiatives unveiled stem in part from input received during FDA's public outreach meetings held late last year and build upon programs already underway at FDA to help ensure the safety of all foods. "FDA's scientific review continues to show that all bioengineered foods sold here in the United States today are as safe as their non-bioengineered counterparts," said Jane E. Henney, MD, Commissioner of Food and Drugs. "We believe our initiatives will provide the public with continued confidence in the safety of these foods."

FDA will publish a proposed rule mandating that developers of bioengineered foods and animal feeds notify the agency when they intend to market such products. FDA also will require that specific information be submitted to help determine whether the foods or animal feeds pose any potential safety, labeling or adulteration issues.

Although the current consultative process has worked well, and the agency believes it has been consulted on all bioengineered foods and feeds currently on the market, FDA will propose to strengthen this process by specifically requiring developers to notify the agency of their intent to market a food or animal feed from a bioengineered plant at least 120 days before marketing. After reviewing the company's submission, FDA will issue a letter to the firm describing its conclusion about the regulatory status of the food or animal feed. To make sure that consumers also have access to product information, FDA will propose that submitted information and the agency's conclusions be made available to the public, consistent with applicable disclosure laws, by posting them on the FDA Web site for easy viewing.

In a related step, the agency will augment its food and veterinary medicine advisory committees by adding scientists with agricultural biotechnology expertise. FDA will use these committees to address over-arching scientific questions pertaining to bioengineered foods and animal feed.

FDA also announced today plans to draft labeling guidance to assist manufacturers who wish to voluntarily label their foods being made with or without the use of bioengineered ingredients. The guidelines will help ensure that labeling is truthful and informative. To receive maximum consumer input, FDA will develop the guidelines with the use of focus groups and will seek public comment on the draft guidance.

Source: "FDA to Strengthen Pre-Market Review of Bioengineered Foods." *HHS News*. United States Department of Health and Human Services. May 3, 2000. <http://www.fda.gov/bbs/topics/NEWS/NEW00726.html>

A SAMPLING OF BIOTECH PRODUCTS ON THE MARKET

Bollgard with BXN Cotton (Produced by Calgene, LLC) - These cotton plants will require less chemical herbicide and insecticide to lower grower costs and to achieve greater crop yield.

Laurical® (Produced by Calgene, LLC) - A less expensive source of high-quality raw materials for soaps, detergents and cocoa butter replacement fats. Rapeseed plants with more than 35 percent laurate in oil have been produced.

DeKalBt™ Insect-Protected Hybrid Corn (Produced by DeKalb) - Approved in 1997, select DeKalb hybrids are now available with built-in protection against the European Corn Borer.

FreshWorld Farms Endless Summer® Tomato (Produced by DNAP) - The Endless Summer® tomato is a genetically engineered version of the FreshWorld Farms® tomato on the market since April 1993, and shares its superior color, taste and texture. What's new is its greatly extended shelf life of more than 30 to 40 days after harvest. Company scientists used Transwitch® technology to suppress production of ethylene, the hormone that causes tomatoes and other fruits to ripen.

FreshWorld Farms® Sweet Mini-Peppers (Produced by DNAP) - The FreshWorld Farms® sweet mini-pepper has a novel sweet taste, deep red color and is nearly seedless. It was developed through an advanced breeding technique that captures and stabilizes preferred characteristics such as taste, texture and low seed count.

Chymogen® (Produced by Genencor International) - Chymogen is the biotechnology-produced version of an enzyme (rennet) found in calves' stomachs. The enzyme makes milk curdle to produce cheese. Because it is produced through biotechnology, it is purer, more plentiful and eliminates variability in the quality and availability of calves' stomachs. It is used in approximately 60 percent of all hard cheese products made today.

High Oleic Peanut (Produced by Mycogen) - Peanut plants modified to produce nuts in high oleic acid results in longer life for nuts, candy and peanut butter.

Low Saturate Soybean Oils (Produced by Optimum Quality Grains, LLC) - This oil is 50 percent less saturated fat than commodity soybean oil (vegetable oil), or approximately 8 percent total saturated fat. A 14-gram serving has just one gram of saturated fat - the same as canola oil.

Chy Max® (Produced by Pfizer) - Chy Max® is another version of chymosin, an enzyme that causes milk to coagulate. It is an advanced fermentation ingredient that is of higher purity, quality and activity than natural rennet.

High pH-Tolerant Corn Hybrids (Produced by Garst Seed) - Corn hybrids capable of growing successfully on the severely alkaline soils that characterize the western U.S. Corn Belt.

NatureGard® Hybrid Seed Corn (Produced by Mycogen) - These corn plants express a protein toxic to European corn borer that reduces or eliminates the need for insecticides.

Increased Pectin Tomatoes (Produced by Zeneca Plant Sciences) - Tomatoes that have been genetically modified to remain firm longer and retain pectin during processing into tomato paste.

Source: Agricultural Biotech Products on the Market. Council For Biotechnology Information. 1625 K Street, NW, Suite 1100, P.O. Box 34380, Washington, DC 20043-0380. 2002. <http://www.bio.org/food&ag/approvedag98.html>

A SAMPLING OF BIOTECH PRODUCTS SOON AVAILABLE ON THE MARKET

Genetically Engineered Cotton Fiber (Produced by Agracetus) - This product will enhance fiber performance, reduce dye-shop pollution and improve textile manufacturing efficiency.

Medium Chain Fatty Acids/Medium Chain Triglycerides (Produced by Calgene, LLC) - This will be a less-expensive source of raw materials for high-performance lubricants, nutritional formulas and high-energy foods.

High Sweetness Tomato (Produced by Calgene, LLC) - Tomato plants that produce high flavor tomatoes.

Genetically Engineered Fruits and Vegetables with Longer Post-Harvest Shelf Life (Produced by Agritope, Inc.) - Using ethylene-control technology, Agritope, Inc., has created delayed-ripening, longer-lasting tomatoes, raspberries and strawberries.

AquaAdvantage® Salmon, Tilapia, Trout, and Flounder (Produced by A/F Protein) - The Conventional fish breeding techniques require three years to bring a fish to market. AquaAdvantage® salmon, tilapia, trout and flounder have the capability of growing from egg to market size (8 to 10 lb.) in one to one-and-a-half years. This new salmon could make fish more plentiful, decrease overfishing of wild salmon and lower consumer costs.

Ripening-Controlled Bananas and Pineapples (Produced by DNAP) - Using the same ripening control technology as in its Endless Summer™ tomato, the company is developing banana and pineapple varieties with extended market life.

High-Solids Potato (Produced by Monsanto) - Monsanto has developed a higher-starch content potato. With the reduction in the percentage of water in the genetically improved potato, less oil is absorbed during processing, resulting in a reduction of cooking time and costs, better-tasting french fries and less-fatty potato chips, and an economic benefit to the processor.

B.t. Sunflower, Soybeans, Canola and Wheat (Produced by Mycogen Corp.) - These crops will express a protein toxin providing protection against various caterpillar and beetle pests.

Banana (Produced by Zeneca Plant Sciences) - Zeneca is developing an inherent resistance to disease and modifying ripening characteristics in bananas. This will reduce the need for chemical fungicides, as well as improve the agronomics of production and the quality to the consumer.

Modified Lignin in Paper Pulp Trees (Produced by Zeneca Plant Sciences under separate agreements with Shell Forestry and Nippon Paper) - By making lignin easier to remove from cellulose - the primary ingredient in paper - papermakers can make high-quality paper with less energy and bleaching, which benefits both the paper processor and the environment.

Insect Protected Tomatoes (Produced by Calgene, LLC) - These tomato plants will require less chemical insecticide to achieve higher yields.

Ripening-Controlled Cherry Tomatoes (Produced by DNAP) - Using the same technology as its Endless Summer tomato, these cherry tomatoes have longer market life, improved flavor, and better harvesting traits.

Strawberry (Produced by DNAP) - These strawberries have a longer market life due to maintaining firmer fruit after harvest and increased resistance to disease while growing.

High-Stearate Soy Oil (Produced by Monsanto) - These soybeans produce a high-stearate oil that requires no hydrogenation and contains no trans-fatty acids, which increase cholesterol. This is a healthier oil for margarines and shortenings.

Fresh Market Tomato (Produced by Zeneca Plant Sciences) - These tomatoes have enhanced flavor, color and increased antioxidant vitamin content.

Source: *Agricultural Biotech Products on the Market*. Council For Biotechnology Information. 1625 K Street, NW, Suite 1100, P.O. Box 34380, Washington, DC 20043-0380. 2002. <http://www.bio.org/food&ag/approvedag98.html>

IACP ON TOUR: EXPLORING THE ISSUES OF FOOD BIOTECHNOLOGY

In early 2001, the International Association of Culinary Professionals (IACP) conducted discussions on food biotechnology with panels of experts in six U.S. cities: Los Angeles; New York; Chicago; Dallas; Portland, Oregon; and Washington, D.C. Individuals ranging from consumers and ethicists, to chefs and scientists, and to organic farmers and opinion leaders held passionate dialogues in which they presented their various perspectives and views. This article highlights some of the views expressed at those sessions.

At IACP in New York, Dr. Peter Day, head of the Biotechnology Center for Agriculture and the Environment at Cook College, Rutgers University, described food biotechnology as follows: "We use living organisms to make beer and wine and cheese...Our ancestors were continuously engaged in selecting the best plants and cultivating their progeny, developing higher yields and improving their resistance to insects, to drought and to temperature extremes...Biotechnology speeds the accuracy of the process and creates new opportunities for pioneer plant breeders."

The View of the Organic Industry

All six panels contained individuals who represented the Organic Trade Association's (OTA's) view of food biotechnology. In the discussion in Washington, D.C., OTA's view was summed up as follows: "All Earth's inhabitants have the most to lose in the long run because little thought is being given to the consequences of what genetically engineered crops will do to the environment and to biodiversity. Earth's ecosystem could be turned upside down. There will be no way to undo the damage or recall new organisms that have been unleashed." OTA has called for a moratorium on the agricultural production of crops through biotechnology.

Brian Halweil of the Worldwatch Institute stated that: "There is no question that biotechnology contains some real potential for agriculture, for instance as a supplement to conventional breeding or as a means of studying crop pathogens. The biggest hope for agriculture is not something biochemists are going to find in a test tube. The greatest opportunities will be found in what farmers already know, or in what they can readily discover on their farms."

Because Something Might Happen, Does Not Mean That it Will Happen

Passions were white hot among some advocates and critics of biotechnology, although remarkably, many more found they could comfortably support aspects of both sides of the debate. It became increasingly clear that there is no "side" to be on.

There has also been some good news. According to the National Center for Food and Agricultural Policy, herbicide-resistant crops have led to an overall reduction in herbicide use and a switch to more environmentally friendly herbicides. Therefore, in the words of Irena Chalmers, culinary author and teacher at the Culinary Institute of America, "It is difficult to understand why those who lined up against the use of pesticides are now voicing their opposition to NOT using them."

The View of Consumers

Despite all the ferment and angst among some, the International Food Information Council's (IFIC's) fifth survey of U.S. consumer attitudes toward food biotechnology found that more consumers than before (64 percent) are expecting benefits from biotechnology. In addition, the survey found that consumers may be surprisingly oblivious to the discussion of labeling of foods produced with the aid of biotechnology. The poll showed that three of four consumers could not think of any additional information that they would like to see on food labels. Support remained high (70 percent of respondents) for the U.S. Food and Drug Administration's labeling policy regarding food biotechnology, which requires no special labeling except when the use of biotechnology introduces an allergen or when it substantially changes a food's composition or nutritional content. (The survey was conducted in January 2001 by Wirthlin Worldwide, and was discussed in depth in the March-April 2001 issue of Food Insight.)

The View of Scientists

Research undertaken by more than 400 scientists from Asia, Africa, Latin America, and the United States has produced an improved strain of rice that will eventually better the diets of nearly two and a half billion people. The rice's ability to produce beta-carotene (provitamin A) will help reduce the risk of severe vitamin A deficiency and the subsequent onset of blindness in infants. The United Nations Children's Fund says that more than a hundred million children suffer from vitamin A deficiency. The "golden rice" also contains three times more iron than other strains of rice, which will help prevent the anemia that is prevalent in women suffering from malnutrition. The Rockefeller

continued

Foundation, a nonprofit organization, provides the technology for golden rice at no cost to developing countries. Martina McGloughlin, director of the Biotechnology Program and Life Sciences Informatics Program at the University of California, Davis, stated simply that "The many and varied tools of biotechnology hold great promise for increasing the efficiency and sustainability of agriculture, and assuring the abundance, variety, quality, and safety of food."

The View of Ethicists

Dr. Richard Sherlock, a professor of philosophy in the Department of Languages and Philosophy at Utah State University, addressed the issue head on. He declared unequivocally, "The central anxiety is not about the science but a quasi-religious belief that may be nontheistic - or a thinking about the natural way of being. Many consumers believe - largely erroneously - that eating genetically enhanced food is dangerous... Few people know what the data is. As a result, pastoral concerns are now being legislated."

Is Food Produced Through Biotechnology Safe?

Those concerned about biotechnology proclaimed that safety is a major issue, but it is one that is almost impossible to quantify, partly because security is a matter of perception. There are remarkable similarities between the controversy over foods produced through biotechnology and the one that raged in the early 1900s when evidence began mounting that there was a link between the consumption of raw milk and tuberculosis. The remedy (pasteurization) was bitterly criticized and tenaciously fought by its critics who said that pasteurization is little more than an excuse for the sale of contaminated milk and would discourage efforts to produce pure, fresh milk. Nevertheless, with the single exception of a clean water supply, this public health measure has saved more lives than any other.

Caution is a good thing because genuine consumer concerns must be addressed before new ideas can be accepted and risks are taken only when they are outweighed by benefits. Safety concerns us all, yet as Irena Chalmers observed, "While nearly 300 million North American consumers have been eating several dozen foods enhanced through biotechnology since 1994, not a single cough or cold or allergic reaction can be attributed to foods produced through biotechnology." The World Health Organization, the American Medical Association, The National Academy of Sciences, The European Federation of Science and Technology, and dozens of other scientific and trade organizations, including the 28,000-member Institute of Food Technologists, endorse the safety of food produced through biotechnology.

However, although safety is paramount, it is not absolute. Food choices have always been and will continue to be dictated not only by wholesomeness and nutritive value but also by history or geography and by custom or religious belief.

Conclusion

When the sequence of the human genome was released in 2000, scientists were able to glimpse the infinite possibilities that lie ahead. Dr. Michael Lawton of Rutgers University summed up the current situation saying, "When the dust has long settled on this argument, both biotechnology and organic farming will be viewed as useful and compatible approaches to improving agricultural produce and practice. The term 'genetic engineering,' which at present induces a degree of discomfort in the public...will be viewed neutrally as a technology that can be used for purposes both noble or base, for profit or not, to improve the crunch in breakfast cereals or help feed the world."

Source: "IACP ON TOUR: Exploring the Issues of Food Biotechnology." *Food Insight*. International Food Information Council Foundation. July/August 2001. <http://www.ific.org>



Food Biotechnology Example

THE AMERICAN MEDICAL ASSOCIATION UPDATES POSITION ON FOOD BIOTECHNOLOGY

During the December 2000 interim meeting of the American Medical Association (AMA), physician delegates adopted a favorable position and list of recommendations concerning crops and foods produced using biotechnology. The action followed an AMA Council on Scientific Affairs review of numerous reports and journal articles relating to agricultural and food biotechnology. The AMA found that foods produced through biotechnology "are substantially equivalent to their conventional counterparts," and stated that there is a lack of scientific justification for special labeling of foods produced through biotechnology. The AMA recommendations include having science-based federal regulation of agricultural biotechnology and continued research of environmental impacts as well as the safety assessment of such foods. They also recommended ongoing research and development and for the government, industry, scientific and medical communities to increase consumer education and access to unbiased information on agricultural biotechnology.

Excerpted From: *Genetically Modified Crops and Foods*. American Medical Association. 515 North State Street, Chicago, IL. 2000. <http://www.ama-assn.org/ama/pub/article/2036-4030.html>

THE ORGANIC FARMERS' AND ORGANIC CONSUMERS' PERSPECTIVE ON GENETICALLY ENGINEERED ORGANISMS

Genetically engineered organisms (GEOs; also called genetically modified organisms, or GMOs) are organisms that have acquired genes and traits through laboratory insertion of genes into their chromosomes, rather than through breeding. GEOs do not have newly created genes; rather, they are usually given genes from different species, orders, or kingdoms that could not have been acquired naturally. For example, a variety of strawberry has had a gene from a flounder inserted into its chromosomes to make it less susceptible to frost damage.

Over the last decade, the use of GEOs has grown exponentially in both medical and agricultural markets. Medical products from GEOs include insulin and antibiotics. In U.S. supermarkets, about 50% of processed food on the shelves now carries an ingredient from a GEO (many of these ingredients are derived from genetically engineered corn, canola, and soybeans). The most controversial use of GEOs is as foods and agricultural crops. Unlike in drug production, in which GEOs are confined to laboratories, genetically engineered crops cover tens of millions of acres. Unlike drugs produced by GEOs, which are reviewed for safety by the Food and Drug Administration (FDA), GEO foods are almost never tested for risks to health. GEO foods may be derived from genetically engineered crops or from genetically modified bacteria that are used in processed foods. For instance, 60% of all hard cheeses in the United States are processed with an enzyme produced by a GEO. GEO foods should be tested for potential risks to human health such as allergic reactions, toxicity, and production of carcinogens.

The FDA does not regulate or require labeling of genetically engineered foods because it has decided that GEO crops or foods are not essentially different from crops or foods produced through standard breeding. The fact that these organisms contain genes that could not be acquired through breeding or that these genes are spliced, promoted, and turned on in the host chromosomes by the insertion of bacteria and virus genes is not considered relevant by the FDA. Genes acquired through biotechnology are not considered additives, and therefore products containing these genes are not subject to FDA regulation, testing or labeling, as mandated by federal law for food additives.

The Environmental Protection Agency (EPA) has taken the same position as the FDA. The EPA considers genetically engineered crops to be essentially the same as crops derived from standard breeding and, therefore, not subject to EPA regulation. Seventy million acres (about 100,000 square miles) of GEO crops have already been planted in the United States without any testing of how these crops will affect the environment through the dispersal of their foreign genes into related wild species.

A *New York Times* survey found that over 90% of consumers would not eat genetically engineered food if given the choice. If GEO food is not labeled, however, the public cannot use its buying power to shape the market. By failing to require labeling of GEO foods, the government is protecting corporate producers instead of the public.

Over the last decade, the world's largest chemical companies, including Monsanto, DuPont, Dow Chemical, Novartis, and Aventis, have bought the world's largest seed companies. These new seed/chemical companies claim that the crops grown from their seeds will save the expanding population of the world from starvation. To date, few of the GEO crops have shown higher yields than conventional crops, though the profits to seed/chemical companies are higher. Seventy percent of GEO crops are engineered to be tolerant to patented herbicides produced by those same seed/chemical companies. Farmers like these crops because they lower the labor and mechanical costs of cultivation. In 1999, half the soybeans planted in the United States were Monsanto's Roundup-Ready soybeans, genetically engineered to be resistant to Monsanto's herbicide, Roundup.

Organic standards prohibit the use of GEO seed and GEO ingredients in organic food production. Consumers must be granted the right to make informed choices in order to protect their health. Initially, proper identification and labeling that informs consumers about the presence of GMOs in foods should be made available to consumers. Individuals and organizations need to insist that organic standards continue to prohibit the addition of GMOs.

Excerpted From: Dunau, Mark. *Genetically Engineered Organisms*. Northeast Organic Farmer's Association - New York (NOFA-NY). 2002. <http://nofany.org/hottopics/geneticallyengineeredorganisms.html> and *An Urgent Message on Genetic Engineering from CCOF*. California Certified Organic Farmers. 2002. <http://www.ccof.org>

BIOTECHNOLOGY AND THE FUTURE OF FOOD - POSITION OF ADA

Position Statement

It is the position of The American Dietetic Association (ADA) that biotechnology techniques have the potential to be useful in enhancing the quality, nutritional value, and variety of food available for human consumption and in increasing the efficiency of food production, food processing, food distribution, and waste management.

Medical Applications of Biotechnology

Biotechnical methods are now used to produce many proteins for pharmaceutical and other specialized purposes. A nonvirulent strain of *Escherichia coli* bacteria, given a copy of the gene for human insulin, can make insulin; when the gene is “amplified” the bacterial cells produce large quantities of human insulin that are purified and used to treat diabetes in human beings. Human insulin, the first genetically engineered product to be produced commercially (Eli Lilly and Co), was approved for use in 1982. Since then, a number of other genetically engineered products have been approved, including human growth hormone, alpha interferon, recombinant erythropoietin and tissue plasminogen activator, and a variety of pharmacologic drugs. Microorganisms can also be engineered to produce digestive enzymes. In the future, these microorganisms could be colonized in the intestinal tract of persons with digestive enzyme insufficiencies. Similarly, persons with immune disorders could be treated with nonpathogenic microorganisms that have been genetically modified to produce antibodies.

Food Ingredient and Processing Applications

In addition to the genetic manipulation of whole plant foods and animals, microorganisms can be designed to improve the efficiency of fermentations and other primarily enzymatic processes and to produce natural food ingredients. Biotechnical methods can produce food materials with improved nutritional value, functional characteristics, shelf stability, and/or sensory characteristics; more efficient processing techniques; more sensitive analytic techniques for quality control and food safety; and bioremediation techniques that convert by-products to fuel, chemicals, or usable materials.

Microbes have been genetically engineered to produce amino acids for the synthesis of aspartame. In addition, plant cells grown in fermenters can produce flavors such as vanilla, reducing the need for extracting the compounds from vanilla beans. Food processing has benefited from biotechnically produced chymosin (rennet), which is used in cheese manufacture; alpha-amylase, which is used in production of high-fructose corn syrup and dry beer; and lactase, which is added to milk to reduce the lactose content for persons with lactose intolerance. The FDA has affirmed the GRAS (Generally Recognized As Safe) status of alpha-amylase and chymosin produced by genetically modified microorganisms, thereby allowing their use in place of the conventional sources of these enzymes for starch hydrolysis and cheese manufacturing. Genetically engineered enzymes are easier to produce than enzymes isolated from original sources and are favored over chemically-synthesized substances because they do not create by-products or off-flavors in foods.

Food Safety Applications

Biotechnology offers effective techniques to address consumer concerns about microbial contamination of foods. Biotechnical methods may be used to decrease the time necessary to detect foodborne pathogens, toxins, and chemical contaminants and to increase detection sensitivity. Enzymes, antibodies, and microorganisms produced using rDNA techniques are being used to monitor food production and processing systems for quality control. Microbial probes, biosensors based on adenosine triphosphate (ATP) content, are being used experimentally as indicators of bacterial contamination. Biosensors to detect animal disease, alterations in product quality, or temperature abuse are under investigation. These developments offer the potential of lowering the cost and improving the safety of the food supply in a timely manner.

Waste Management Applications

Waste management, or bioremediation, is an area of increasing interest to consumers. Through application of biotechnical methods, enzyme bioreactors are being developed that will pretreat some disposable serveware or food waste components and allow their removal through the sewage system rather than through solid waste disposal mechanisms or will allow their conversion to biofuel for operating generators. Microbes can be induced to produce enzymes needed to convert biodegradable materials into the building blocks for new polymers. Waste streams can be controlled to convert by-products to biofuel (wheat straw to glucose to ethanol), specialty chemicals (sugar or fat substitutes), or feedstocks and other useful materials (packaging materials or coatings).

continued

Issues of Biotechnology In The Food System - Public Health/Food Safety Issues

Biotechnology applications in food and agriculture are the subject of extensive regulatory review to protect against potential negative effects on food safety and the environment. Federal agencies involved in biotechnology regulation include USDA, which evaluates whole foods and production processes; FDA, which evaluates whole foods, food ingredients, and food additives; and EPA, which evaluates production process.

Labeling

Labeling food from genetically modified plants and animals has become an important issue. Some consumers and consumer groups believe they have a right to know whether genetic engineering was used to produce a food, some want to be able to choose food on the basis of how it is produced, and some believe labels are needed to notify consumers of potential allergens. Others believe labeling is not necessary if foods are essentially equivalent in composition.

Food labels are regulated by FDA and, in some cases, by USDA. Regulatory agencies are concerned with ensuring that food labels are both true and not misleading. As a result, label information may be compulsory, permitted, or prohibited. In all the assessment considerations, producers of whole foods or food components produced biotechnically must provide evidence that no safety issues are raised. New products must comply with existing portions of the Food, Drug, and Cosmetic Act. For example, if producers introduce a potential allergen into a food, a compulsory label declaration must be made so that allergic consumers can avoid the product. Failure to do so would be regarded as misleading labeling and would result in enforcement action against the producer.

On a case-by-case basis, some types of label declarations are permitted. For example, a food processor seeking to sell cheese to vegetarians would be permitted to include the statement on the cheese: "Made using microbial enzymes; no animal rennet used."

Misleading label statements are prohibited, even if they are true. For example, FDA guidelines do not allow a label statement such as "the milk was derived from cows not injected with bST" unless an accompanying statement makes it clear that there is no substantial difference between milk from bST-treated cows and milk from untreated cows. The FDA's rationale for requiring the qualifying statement is that a "no bST" declaration should not be construed to imply that milk from bST-supplemented cows is less wholesome.

Although FDA evaluates food products and ingredients produced using biotechnology on a case-by-case basis, the labeling regulations bear out the historical whole-food approach; if the whole food is not materially different from its traditional counterpart, mandatory labeling designating it as a product of biotechnology is not required and is, in fact, misleading unless accompanied by a statement clarifying that there is no difference in healthfulness between the two products. Whereas FDA's approach to labeling biotechnically produced foods is based on sound science, it is not without controversy. Some groups believe it does not adequately provide for consumer right-to-know and social issues; others are content with the present arrangements.

Social and Consumer Issues

If biotechnology is to be used to ensure a safe, abundant, and affordable food supply, it must be accepted by the public. Increasingly, public interest groups are questioning whether technological change is good or needed, particularly as it affects food safety, the environment, animal rights, and the changing structure of agriculture.

Recent surveys regarding consumer attitudes about biotechnology have shown that consumers are not well informed about biotechnology, but are interested in it and are cautiously optimistic about its use in food production and processing. Certain applications were more acceptable than others, however, depending on the perceived value and potential effects. For example, using biotechnology to change plants was considered much more acceptable than using it to change animals. Transgenic applications of biotechnology, such as the insertion of animal genes into plants, were unacceptable to many participants. Environmental concerns were important to most people and many considered ethical issues important as well. Consumer concerns about biotechnology related to perceived unpredictability, risks to the environment, alterations in the ecosystems, and moral and social questions.

Implications

Consumers perceive dietetics professionals as reliable providers of food and nutrition information and services. Nearly all of those surveyed wanted more information on biotechnology and food. A critical issue is food safety. Issues of a social, ethical, economic, and environmental nature are also of concern. Improved knowledge will permit consumers to focus on substantive issues and evaluate the validity of these new technologies effectively.

Excerpted From: "Biotechnology and the Future of Food — Position of ADA." *Journal of the American Dietetic Association*. 1995. Vol. 95 pp. 1429-1432. (reaffirmed and update to be published, 2000). <http://www.eatright.org/abiotechnology.html>

POSSIBLE INFORMATION FROM THE FOOD BIOTECHNOLOGY EXAMPLE

Research Issue: Labeling of Genetically Engineered Foods

MY POINT OF VIEW

My opinions about this issue are:

I agree with the current FDA position that special labeling is needed if the food has a changed nutritional content or if it might cause food allergies. I do not believe a plant that has received genes from animals would necessarily need to be labeled.

My opinions are based on the following facts:

Rice contains genes for proteins that occur naturally in the human brain.

I plan to write to:

*Food and Drug Administration
Office of Consumer Affairs
HFE-88
Rockville, MD 20857*

THEIR POINT OF VIEW

The position of the Food and Drug Administration is based on the following facts:

Genetically engineered foods do not need to be specially labeled except in certain cases, such as when there is a risk of food allergy or change in nutritional content

The position of some producers is based on the following facts:

Labels placed on all genetically engineered foods would be interpreted by consumers as warning labels and may require special handling or separating these foods during processing.

The position of some consumers is based on the following facts:

All genetically engineered foods should be labeled as such so consumers can choose whether or not to eat them.

ISSUE INVESTIGATION

What is known about this issue	Sources of information for research	Individuals and groups involved in this issue	Who or what this issue is affecting	History of this issue
<i>-FD&C Act defines information the label must include -Law prohibits false or misleading food labeling</i>	<i>-the FDA (Food and Drug Administration) -USDA Biotechnology Information Center -Calgene, Inc. -“The Biotech Debate: Labeling of Genetically Engineered Foods” (video available from the USDA National Agriculture Library) -IFIC Factsheet</i>	<i>-consumers -producers -the FDA -genetic engineers</i>	<i>-people with food allergies -processors -consumers’ “right to know”</i>	<i>In May 1992, the FDA ruled that special labels are not required for foods developed by genetic engineering, except under certain circumstances.</i>

ISSUE FACTS AND OPINIONS

Facts about this issue (neutral statements that can be proven)	Opinions about this issue (points of view, judgments, conclusions)	Opinions stated as facts about this issue
<i>-In June 1992, the Pure Food Campaign petitioned the FDA to require labeling of all genetically engineered foods. -Serum from people allergic to Brazil nuts reacted to soybeans that had received a desirable gene from Brazil nuts.</i>	<i>-Genetically engineered foods are as safe as other foods. -The FDA concluded that the FLAVR SAVR tomato has not been significantly altered and is as safe to eat as other tomatoes.</i>	<i>-All people allergic to Brazil nuts also will be allergic to the modified soybeans.</i>

*Never doubt that a small group of thoughtful,
committed citizens can change the world.
Indeed it's the only thing that ever has.*

Margaret Mead